



PC Builder

You can build a computer in just about anything these days – all you need are the right tools and a little imagination. Josh Blodwell demonstrates by turning a DVD player into a PC



INTEL REJIGS PROCESSOR NAMES

Intel has changed its naming scheme for processors again. Intel first revised its naming scheme with the release of its Socket 775 line. The three-digit numeric scheme was supposed to make it easier for customers to compare features. However, Intel has now announced another way of naming processors. Instead of using a purely numerical code, the new system is a combination of letters and digits, much like the naming systems currently used on ATI and nVidia graphics processors.

Time will tell if Intel has come up with model numbers that help their customers compare processors without having to consider technicalities such as clock speeds, cache, frontside buses and cores. Many hardware sites have opted to show the processor's new code along with a full description. Clearly they expect customers to continue using the old methods to decide which processor to buy.

One of the joys of building your own PC is that the finished result can be unlike anything you could buy off the shelf. If you want to build a tiny PC or something truly individual, this month's project is for you. As you'll see, building a PC in a toaster, a cigar box or even a traffic cone isn't too difficult. All you need are the correct components and a bit of knowledge.



▲ It may look like a normal DVD player, but inside lurks a capable PC

SIZE MATTERS

A whole market has sprung up around the hobby of custom-built PCs, with people using components designed for use in point-of-sale machines, laptops and information points. The main component that makes all these custom computers feasible is the Mini-ITX motherboard. This tiny computer mainboard measures just 170mm square and comes with processor, graphics and Ethernet networking built in. They aren't fast – the cheaper models run at a processor speed of less than 1GHz – but even these have enough power to run Windows XP, as long as you use 512MB of memory. A typical 533MHz model is available from www.mini-itx.com for £65 including VAT.

People trying to build the most compact system possible have found themselves looking to laptops for other system parts. Laptops use a standard system of components just like a PC, but

smaller. The standard laptop hard disk is a 2½" model (7cm wide) that uses an IDE controller like your desktop PC. Due to size constraints, the connections at the back of a laptop drive use a different layout than on a 3½" drive, but converters are available from www.mini-itx.com for £9 including VAT.

Laptop optical drives are similar; they are only slightly larger than the optical disks. A typical size is 128x12.7x129mm – although the size can vary slightly – so they're a lot smaller than the 5¼" drive dimensions of 146x41.2x178mm (5¼" and 3½" describe the media they use, not the drive). Once again, you need a converter to be able to plug regular IDE cables and Molex power connectors into the laptop drive.

You can get power to your custom computer without having to accommodate a full-sized ATX power supply unit (PSU). Just buy an external PSU

KEEP YOUR CABLES TIDY

REVIEW CABLE TIDY

MAPLIN 12mm Spiral Cable Wrap

RATING ★★★★★

PRICE £3.50 inc VAT

SUPPLIER www.maplin.co.uk

Spiral wrap is used to tidy the PSU wires that snake around in computer cases, improving airflow and neatening the appearance of your PC. This white wrap isn't especially attractive, but it's excellent for keeping your PC's wiring under control. It's also very easy to install; you just wrap it around the cabling, and it will pull it all into neat lengths of cable that are easier to route than unsheathed wires.

The wrap is sold in lengths of 10m, and comes in sizes from 3mm for £1.50 to 24mm for £8.

REVIEW CABLE TIDY

LIZARD TREE Chameleon Springs

RATING ★★★★★

PRICE £15 inc VAT

SUPPLIER www.kustompcs.co.uk

Chameleon springs are used to tidy up the wiring in cases, binding the wires together, making them easier to manage in your case. Unlike spiral wrap, Chameleon Springs are attractive and come in a selection of colours, including Ultra Violet reactive type that glows under UV light. The springs are easier to install than spiral wrap, and you can stretch them out to tidy more wire if needs be. You get six 90cm lengths in three different size grades in a pack: four small, one medium and one large, which is enough to tidy up a single PSU.

REVIEW CABLE TIDY

MAPLIN 150-piece Cable Tie Kit

RATING ★★★★★

PRICE £3 inc VAT

SUPPLIER www.maplin.co.uk

Spiral wrap and Chameleon Springs are both expensive ways of fixing the problem of untidy cabling. Cable ties fulfil the same purpose, but with a couple of drawbacks. They look scruffy next to the other two wire tidies, and each tie can be used only once. They can also be tricky to remove if you need to make changes to your PC. They cost a fraction of the price, though, and are very strong. This pack from Maplin costs £3, but you get 150 cable ties in three sizes: 50 each of 100mm, 203mm and 280mm. This is more than enough to wire 10 computers.



that provides all the connectors you get on the full sized supply. These PSU kits come with three parts: an external power brick (like those used with laptops), a power converter PCB and a wiring loom to provide all the necessary power connectors.

To keep everything cool, you may also need to add a fan. The size of fan will depend on the size and shape of your custom case. The fan is used to suck air out of the case, while cool air is drawn in through a simple vent. You must position intake and exhaust to create a flow of air over the Mini-ITX motherboard, or your computer could overheat and become unstable.

CHOOSING YOUR CASE

When you have all your components, you need to decide what case to place them in. We chose a broken DVD player because it will slot away with other similar devices under a TV. An old separates CD player would make an excellent MP3 jukebox to attach to your hi-fi, or you could make a four-slot-toaster video player to attach to the kitchen TV.

You might not need an optical drive in all situations, which can save you a lot of space and money. If you were going to make a video player, you could transfer ripped media from another PC via the Mini-ITX board's network adaptor. To save even more space and money, you could choose to force your motherboard to boot from a properly configured server on your network. This lets you do away with a hard disk; however, this is only cost-effective if you use the GNU Linux operating system. If you want a challenge, check www.kegel.com/linux/pxe.html for details of configuring Linux to boot across a network.

1 Before you start building a PC in your case, you may need to take the old workings out. A socket screwdriver and a good selection of bits – including Torx heads – will probably be needed. Look for large main screws that hold the internals to the chassis and take them out first. Remove any buttons on your custom case carefully, and keep the pieces, screws and any connecting wires to one side. It's often possible to rewire your computer's power and reboot buttons to the original device controls.

2 Positioning the optical drive is often the hardest part of designing a custom case. Consider this first, then fit the other components around it. A DVD drive needs a slot through which to eject its tray. In our case, the obvious place was where the original DVD tray ejected; the drawback to this is that the DVD drive must then sit on the base plate of the case, leaving no room for the motherboard. We needed another option.

With our DVD player, there is a display panel directly above the drive tray that can be removed to create an alternative aperture. We could use a craft knife to cut out the display unit carefully, then remove the fascia of the original drive tray; these normally clip off easily. We could then glue the display and drive fascia parts together to make a single piece that fits into its original position and can be glued on to the front of the new DVD drive.

This would allow the DVD drive to be elevated in the case, leaving enough room below for us to mount the motherboard. To hold the DVD drive solidly, you can construct a shelf (even one made of

wood) from one side of the case to the other. Just use whatever materials you have to hand.

3 We decided the best layout involved leaving the DVD drive on the floor of the case and elevating our motherboard over the drive. To create little stilts for the board we used standoffs, the small brass nuts that provide clearance under a motherboard in a normal case.

However, this will make our system a lot less robust, so we will have to take care when plugging devices in to the computer. If you have time, it's better to create a bracket that can hold the motherboard securely.

4 Position the motherboard so it lies with the connection ports (serial, parallel, VGA and so on) at the back, protruding slightly from the case. The motherboard should come with a back plate, a rectangular panel cut out to fit over the ports. You need to cut a rectangular hole in the back of the case into which you fit this back plate. A Dremel multitool with a reinforced cutting disk is perfect for this. They aren't cheap, though, costing £47 from www.tooled-up.com. A junior hacksaw for just over £1 would do the job adequately.

You have to take account of the height the motherboard will be standing above the floor of the case. Some custom system builders use Velcro to fix their motherboards. This makes the board sit about three millimetres above the floor of the case, and because Velcro is made of nylon it is an insulator so it won't short out any components. It also allows slight adjustments to be made with very little effort.

Make sure your computer's parts aren't being short-circuited on metal before you turn the system on for the first time. Mistakes can be expensive. If you short out your motherboard, you may damage every one of your computer's components. Also check that metal isn't touching anything except the screw holes of your components. In our system, we used standoffs to lift our hard disk and power unit away from the bottom of the steel DVD player shell.

5 If you don't have the space, you can use an insulator between the affected components and the case. We used a sheet of strong card on the top of our upturned motherboard to stop it being shorted out by the case's metal lid, but a sheet of plastic such as a jewel CD case would also work well.

When you're sure the components are properly installed, turn on the power. Once you've installed an operating system, you should do a burn-in test of your custom PC, just as a manufacturer such as Dell would do. You could run a benchmark such as PCMark04 from www.futuremark.com, but ensure you test your PC in the environment it will be used in; for example, under the TV. Keep a close check on how hot the case gets, especially in the area above the motherboard or hard disk. If it doesn't overheat after a couple of hours of heavy use, it will be fine. **CS**

NEXT MONTH

RAID

How to improve your disk performance and reliability

